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# INTEGRATED SYSTEMS ENGINEERING: DESIGNING MARTIAN SURFACE NETWORK TOWERS

**Abstract**

This abstract introduces a systems engineering approach aimed at proposing the deployment of network towers on the Martian surface to optimize telemetry signal transfer. The methodology takes into account the distinctive challenges and opportunities inherent in the Martian environment. this work incorporates findings from research gaps within the realm of systems engineering, considers the unique characteristics of Martian soil composition, and aligns with the objectives outlined in the "Systems Engineering Approaches, Processes, and Methods" session description.The proposed approach adopts a multidisciplinary perspective, drawing insights from planetary science, telecommunications engineering, materials science, and environmental sciences to tackle the challenges associated with establishing communication infrastructure on Mars. It places a significant emphasis on risk management and reliability engineering, aiming to ensure the robustness and longevity of network towers. This approach aligns with the overarching goals of minimizing development time and life cycle costs.By integrating principles from space systems architecture, conducting trade-off studies, and employing optimization tools, the proposal seeks to enhance the design and strategic placement of network towers. This optimization process takes into consideration the influence of Martian soil composition, aeolian processes, and electromagnetic properties on the infrastructure.The proposal recognizes the critical significance of customized Assembly, Integration, Verification, and Validation (AIVV) processes, tackling challenges associated with material compatibility, environmental interaction, and the long-term reliability of communication infrastructure. Additionally, it underscores the importance of stakeholder management, technical planning, and risk management in the unique context of establishing and maintaining network towers on Mars. By synthesizing insights from research on Martian soil composition and principles of systems engineering, this proposal aims to contribute to the creation of a robust and resilient communication infrastructure on the Martian surface. It aligns with the objectives outlined in the session description by addressing the intricacies of establishing

network towers on Mars, accounting for research gaps, and employing multidisciplinary methodologies to meet stakeholder needs, thereby ensuring the reliability and sustainability of Martian communication systems.